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PORTABLE CELL PHONE DOCKING SYSTEM

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BACKGROUND OF THE INVENTION

Field of the Invention

The invention relates to wireless communication technology and, more particularly, to technology for enhancing the capabilities of wireless communications devices, such cellular or PCS telephones, so as to more closely approach the capabilities of personal computers, especially as those capabilities relate to the enablement of Internet access or access to other sources of data or information.

Description of the Related Art

In recent years the personal computer (PC) industry has witnessed a sea change in the manner in which PCs are primarily used. During earlier stages in the rise of PC popularity, PCs were primarily taken looked to for of their computational capacity. Subsequently, word processing, spreadsheet, database and presentation applications began to assume the forefront. Still more recently, the PC has come to be seen as a communications device, and has experienced rapidly expanding use as a communications terminal from which to send and receive electronic messages. Along these lines, consumer acquisitions of PC's have lately been stimulated by the objective of using the PC simply as an appliance to access the Internet. In this mode, much of the embedded capability of the PC lies dormant, and PC users tend to become pre-occupied with information transmission bandwidth, rather than processing power or expandability.

Concurrently, the proliferation of wireless communications devices, such as cellular telephones, has accelerated to the point that cellular telephones appear ubiquitous and are predicted by some to ultimately displace wired communications facilities. In fact,

cellular telephone sales now exceed sales of PCs by a margin of approximately 2 to 1, and it is anticipated that this margin will expand. As cellular telephone technology has evolved, cellular telephone functionality has become correspondingly more robust, and cellular phones now offer capabilities that were once the exclusive province of PCs. In fact, some cellular telephones now resemble small, low-end PCs with wireless access to data networks, including the Internet. Ironically, many consumers are now believed to acquire cellular telephones merely as an Internet-access appliance.

That having been said, cellular telephones are burdened by a number of characteristics that render them substantially less than ideal for applications such as Internet access. Perhaps paramount among the shortcomings of cellular telephones is the incommodious user interface they present. Unlike desktop or portable computers, present-day cellular telephones fail to include browsers, or useable displays and keyboards. The small screen size renders cellular telephones unsuitable as an interface to all but the most primitive sources of information, for example, e-mail, stock quotations, paging information, and the like.

Accordingly, what is desired is a solution that enables cellular telephones to operate as a convenient device for obtaining information from on-line, and other, information sources, such as the Internet. Preferably, the solution will not compromise the desirability of the cellular telephone as a portable communications device, but will complement existing cellular telephone capabilities in a manner that promotes the cellular telephone as a viable alternate to low-end PCs that are primarily acquired for use as an Internet-access terminal or as a device to access other information sources.

SUMMARY OF THE INVENTION

The above objects, advantages and capabilities are achieved in one aspect of the invention by a docking station for a wireless communications device, such as a cellular telephone. The docking station includes a support structure that includes a cradle for the wireless telephone and that exhibits a planar surface on which a display device is mounted. An internal charging circuit is coupled to a docking station power source for charging the power source. A first connector assembly couples the charging circuit to an

external source of electrical energy, in an expected configuration, an AC outlet. A second connector assembly coupled to the output of the charging circuit selectively couples the charging circuit to the cellular telephone in order to recharge the cellular telephone battery. A switch selectively couples the station power source to the cellular telephone when the cellular telephone is docked, so that in the docked mode the cellular telephone operates from the station power source, while its internal battery is recharged by the docking station.

The invention likewise inheres in a docking station, for a wireless communication device, that comprises a docking housing having a planar first surface. A display device is mounted on the planar first surface, and a cradle disposed on the docking housing supports the wireless communication device. A connector electrically couples the docking station to the wireless communication device, so as to transmit both power and data to the device. The station is equipped with a charging circuit and a switch that selectively couples the charging circuit to an internal voltage source. In a preferred embodiment, the switch connects the charging circuit to the internal voltage source when there is not a wireless communication device docked at the station. When a wireless communication device is docked, the switch enables the charging circuit to be coupled to the wireless communication device for charging.

From an alternative perspective, the invention is an apparatus, for use in a docking station, that selectively supplies power to a communications device that is docked at the docking station. The apparatus comprises a connector for electrically coupling the docking station to the communication device. The connector has at least first and second terminals. A switch having a pole, a first terminal, and a second terminal is operable in response to status information that indicates whether a communications device is docked at the docking station. A charging circuit is coupled to the pole of the switch, and a station power source coupled to the first terminal of the switch. In addition, the apparatus includes means for determining whether a communication device is docked at the station for providing status information as a result of the determination.

In another embodiment, the invention may be exploited as a method of enhancing the capabilities of a wireless communications device in information acquisition

applications. According to the method, the wireless communications device, which may be a cellular telephone, is mounted on (docked at) a docking station that comprises a receptacle, in the form of a cradle, for the cellular telephone; a display device; a connector for effecting an electrical interface to the cellular telephone; a docking station power source; a charging circuit; and a switch that operates (effects predetermined connection) in response to information indicating whether a cellular telephone is docked at the station. In order to embellish the limited video display capabilities typical of cellular telephones, the video output of the cellular telephone is coupled to an enhanced display provided by the docking station. Where a cellular telephone is docked, the switch causes (i) the station power source to be coupled to the cellular telephone and (ii) the charging circuit to charge the cellular telephone battery.

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BRIEF DESCRIPTION OF THE DRAWINGS

The subject invention may be better understood, and its numerous objects, features and advantages made apparent to those skilled in the art, with reference to the accompanying Drawings, wherein:

Figure 1A is a front perspective of a docking station including a housing 20 on which is mounted an enhanced video display 22 and which includes a recessed cradle 24 for a portable cellular telephone or other form of WCD;

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Figure 1B is a side view of the docking station and depicts a stand 30 for supporting the docking station in an orientation that facilitates viewing of the video display by a user;

Figure 1C is a side view of the docking station that illustrates an alternative support mechanism for the docking station, in the form of a leg assembly 40 that is pivotally attached to the housing; and

Figure 2 is a functional block diagram of interface components that effectuate interoperability of the WCD with the docking station.

DETAILED DESCRIPTION OF THE INVENTION

For a thorough understanding of the subject invention, reference is made to the following Detailed Description, including the appended Claims, in connection with the above-described Drawings. Referring now to Figure 1, the docking station depicted therein is seen to constitute a support structure for a wireless communications device (WCD) (not shown). The WCD may be a cellular telephone, a PCS telephone, a pager, or the like. The support structure, in a preferred embodiment, assumes the form of housing 20 that is characterized by a rectangular cross-section. The housing may have approximate dimensions 10" (H) x 15" (W) x 1" (D). Housing 20 has a substantially planar front surface 21 on which is mounted a flat-panel display device 22. Numerous manufacturers supply display devices of wide-ranging characteristics that are suitable for use in the subject invention. What is primarily significant here is that display device 22 provide performance characteristics, including size and resolution, that are markedly superior to the LCD displays typically incorporated with currently available WCDs. Housing 20 also exhibits a cradle 22 for a WCD. Cradle 22 is shown in Figure 1 as recessed with into front surface 21 of housing 20. The precise geometry of the cradle is not deemed critical, and the salient requirement of the cradle contour is to facilitate convenient placement and reliable retention of the WCD. In general, it may be assumed that the cradle is configured to be complementary to the form of the WCD. Also exhibited in cradle 22 is an electrical connector 23. The primary purpose of connector 23 is to effect an electrical interface between the docking station and the WCD. In this regard, connector 23 contains a number of electrical contacts necessary to realize the necessary conductive connections, as specified below, between the docking station and the WCD. Therefore connector 23 will afford the number of contacts 230, *et seq.* that have the physical dimensions necessary for compatibility with a mating connector provided by the WCD.

For convenient docking and operation of the WCD in the docking station, a mechanism is provided that maintains housing 20 in a generally upright position, in a manner that facilitates accessible viewing by a user of information contained on display device 22. Many options are available to perform this function. Specifically, Figure 1B, in a view at a side of housing 20, illustrates a stand 30 on which the housing may be

disposed. The stand exhibits a bottom portion 31 on which the housing sits and an oblique (to the bottom portion 31) back portion 32 on which housing 20 reclines. In addition, stand 30 includes an integral lip 33 that maintains housing 20 upright in the stand. Stand 30 may be fabricated from any suitable material, including but not limited to metal, plastic, and such.

Alternatively, housing 20 may be maintained in a more or less upright position through a leg assembly 40 that is rotatably attached in the sides of housing 20. Figure 1C depicts the alternative leg assembly. As depicted in Figure 1C, leg assembly may be inserted into opposite sides of housing 28 at receptacles 25, one of which is viewable in Figure 1C.

Housing 20 encloses an electronic interface module 10 that includes a number of components that cooperate to impart enhanced operational features to a WCD when the WCD is docked at the docking station. These components are depicted in Figure 2. As indicated above, and reiterated in Figure 2, the docking station electrical interface between the docking station and the WCD is effected through connector 23, which in Figure 2 is shown to comprise at least four contacts 230, 231, 232 and 233, which correlate to four contacts at a WCD interface connector. Contact 230 is connected to circuit ground (GND) at the docking station and is intended to effect continuity between the docking station and the WCD ground. Contact 231 is denominated "Video" and accepts the video output from the WCD. The video (or data) output of the WCD applied to contact 231 is coupled to a video interface circuit 70. The video interface circuit converts the video signal output from the WCD to the signal(s) necessary to drive display device 22.

In one embodiment, video interface circuit 70 conforms to the Digital Visual Interface (DVI) Specification promulgated by the Digital Display Working Group (DDNG) and published in April 1999. A copy of the DVI specification is included as Appendix A, and is incorporated in its entirety into this Description.

The docking station includes an internal rechargeable battery 40 that is coupled to a contact 232 on connector 23. In the absence of WCD, battery 40 is coupled to charging circuit 50 through switch 60. Charging circuit 50 is coupled to docking station connector

80 and from connector 80 through line cord 81 and plug 82 to an AC outlet. Switch 60 has a pole terminal 61 coupled to the output of 51 of charging circuit 50. The normally closed (NC) terminal 62 of switch 60 is coupled to contact 232. In a manner such as described below, switch 60 is normally closed when no WCD is docked at the station. In this orientation, switch 60 couples charging circuit 50 to internal battery 40 in order to recharge, or maintain the charge on, battery 40. However, when a WCD is docked, docking detector 90 causes switch 50 to be oriented in the normally open (NO) position, in which pole 61 is connected to NO terminal 63. Terminal 63 is in turn connected to contact 233 on connector 23. Contact 233 is coupled through a corresponding contact on the WCD connector to a rechargeable battery in the WCD. In this manner, when a WCD is docked at the docking station, charging circuit 50 operates to recharge the WCD internal battery. In this mode, docking station battery 40 is coupled through contact 232 to a mating contact on the WCD connector. That contact is electrically connected to a B^+ bus in the WCD, so that power to the WCD by the docking station.

As an additional advantageous feature, the arrangement described above allows the WCD rechargeable battery to be recharged, even when the docking station is operating in a portable mode. That is, when line cord 81 is detached from connector 80, or when plug 82 is simply removed from the AC outlet, the docking station becomes portable, and the user will be able to move from one location to another or to perambulate about a given location, while continuing to receive the benefit of the enhanced display. Nevertheless, even in this portable mode, charging circuit 50 will continue to charge the WCD battery.

In order to effectuate the operation described above, the docking station relies on docking detector 90 to determine whether a WCD is docked. Docking detector 90 drives switch 60 in response to information indicating whether or not a WCD is docked. In an illustrative embodiment, a docking detector 90 is coupled to a contact on interface connector 23 that provides information that defines the status of the station that is whether or not a WCD is docked.

If there is no WCD docked at the station, the output of docking detector 90 will drive switch 60 to the NC orientation. That is, pole 61 will be in contact with NC

terminal 62, thereby coupling charging circuit 50 to station power source 40. Conversely, if a WCD is docked, docking detector 90 will drive switch 60 to the NO orientation, in which charging circuit 50 is coupled to the WCD battery, and docking station battery 40 is coupled to in WCD B^+ bus.

A number of approaches may be used to provide docking status information to docking detector 90, and the invention is not limited by specific approach adopted in a particular embodiment. For example, a docking status contact 234 may be provided on interface connector 23. The docking status information, in this context, may simply assume the form of a logic level, a signal, an impedance to GND, or the like that is detected by docking detector 90. Alternatively, the docking station may incorporate a mechanical switch that is actuated when a WCD is docked at the docking station. In accordance with this approach, the mechanical switch may be switch 60, and the need for separate docking detector is largely obviated inasmuch as the docking detection and switching functions are both performed by switch 60.

Accordingly, although there have been shown and described above illustrative embodiments of a Docking Station for a Wireless Communication Device, including what at present is considered the best mode for carrying out the invention, those having ordinary skill in the art will appreciate that various changes and modifications may be made without departure from the scope of the invention. Therefore, the invention is not intended to be limited by the Description above, but is to be defined by the appended Claims, and equivalents thereof.